

Translation

8-22-05  
PATENT COOPERATION TREATY

541583  
PCT/JP2003/016033



PCT Rec'd PCT/PTO 07 JUL 2005

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

10/541583

Applicant's or agent's file reference NE-70144WO	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/JP2003/016033	International filing date (day/month/year) 15 December 2003 (15.12.2003)	Priority date (day/month/year) 07 January 2003 (07.01.2003)
International Patent Classification (IPC) or national classification and IPC H01L 29/812		
Applicant NEC CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 1 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 15 December 2003 (15.12.2003)	Date of completion of this report 06 September 2004 (06.09.2004)
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP2003/016033

## I. Basis of the report

### 1. With regard to the elements of the international application:\*

- ☐ the international application as originally filed
- ☒ the description:  
 pages 1-34, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☒ the claims:  
 pages 1-18, as originally filed  
 pages \_\_\_\_\_, as amended (together with any statement under Article 19  
 pages \_\_\_\_\_, filed with the demand  
 pages 19-20, filed with the letter of 07 June 2004 (07.06.2004)
- ☒ the drawings:  
 pages 1-31, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

### 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

### 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

### 4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/fig \_\_\_\_\_

### 5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP03/16033

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Claims	1-20	YES
	Claims		NO
Inventive step (IS)	Claims	4-6, 10-11, 16	YES
	Claims	1-3, 7-9, 12-15, 17-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims		NO

### 2. Citations and explanations

Document 1: JP, 2000-286428, A (NEC Corp.), 13 October, 2000 (13.10.00), paragraphs [0002] to [0019], Figs. 1-6

Document 2: JP, 11-176839, A (NEC Corp.), 2 July, 1999 (02.07.99), paragraph [0034], Fig. 4

Document 3: JP, 2002-359256, A (Fujitsu, Ltd.), 13 December, 2002 (13.12.02), full text, all drawings

Document 4: JP, 2001-189324, A (Ricoh Co., Ltd.), 10 July, 2001 (10.07.01), paragraphs [0013] to [0020]

Document 5: JP, 2002-222860, A (Sony Corp.), 9 August, 2002 (09.08.02), page 3, right column, line 34 to page 4, left column, line 5

#### Claims 1-3 and 18-20

The subject matters of claims 1-3 and 18-20 do not appear to involve an inventive step in view of documents 1 and 2 cited in the ISR.

Document 1 discloses a field-effect transistor having an electric-field controlling electrode formed through an insulation film in an upper portion of a semiconductor structure of a group III nitride in an area between a gate electrode and a drain electrode, the electric-field controlling electrode being controllable independently from the gate electrode. Document 2 discloses, as a protective film for covering a field-effect transistor, a protective film made by laminating 35 nm silicon nitride films and 65 nm silicon oxide films. A person skilled in the art could have easily conceived of adopting the protective film of document 2 for the insulating film of document 1. Furthermore, a person skilled in the art could have set the electric potential of the electric-field controlling electrode as required.

#### Claims 7, 13-15, 17 and 18

The subject matters of claims 7, 13-15, 17 and 18 do not appear to involve an inventive step in view of documents 1 and 3 cited in the ISR.

Document 3 discloses a group III nitride semiconductor structure formed with an insulating film which has a channel layer composed of  $\text{In}_x\text{Ga}_{1-x}\text{N}$ , an electron supply layer composed of  $\text{Al}_y\text{Ga}_{1-y}\text{N}$ , a contact layer composed of undoped  $\text{AlGaIn}$ , and a cap layer composed of  $\text{GaIn}$ , and is, in an upper portion thereof, formed with an insulating film containing silicon and nitrogen as constituent elements. A person skilled in the art could have easily conceived of adopting the structure described in document 3 as the group III nitride semiconductor structure of document 1.

#### Claims 8, 9, 12 and 18

The subject matters of claims 8, 9, 12 and 18 do not appear to involve an inventive step in view of documents 1, 4 and 5 cited in the ISR.

Document 4 discloses the technique of reducing a parasitic capacitance and improving high-frequency characteristics in a field-effect transistor by using an insulating film of which the permittivity is lower than 3.5. Document 5 describes that an insulating film containing silicon, oxygen and carbon as constituent elements is publicly known as an insulating film of which the permittivity is about 3.0. A person skilled in the art could have easily conceived of adopting the materials described in documents 4 and 5 for the insulating film of document 1.

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**Supplemental Box**

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of : V

The subject matters of claims 4-6, 10, 11 and 16 are neither described nor suggested in documents 1-5 cited in the ISR.